

AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended): A reverberation apparatus for creating an acoustic effect of an acoustic space which is arranged ~~under an instruction of a user~~ with a sound generating point for generating a sound and a sound receiving point for receiving the sound which travels from the sound generating point to the sound receiving point through sound ray paths within the acoustic space, and for applying the created acoustic effect to an audio signal representative of the sound generated from the sound generating point, the reverberation apparatus comprising:

a storage section that stores a directional characteristic representing a directivity of the generated sound at the sound generating point;

~~a position determining section~~ position indicating section that ~~determines a position~~ indicates a position of the sound generating point and a position of the sound receiving point within the acoustic space ~~on the basis of the instruction from the user~~;

~~an orientation determining section~~ orientation control section that ~~determines an orientation~~ changes an orientation of the sound generating point ~~based on the position determined by the position determining section~~ within the acoustic space when the position indicating section indicates change of either of the position of the sound generating point and the position of the sound receiving point;

an impulse response determining section that determines an impulse response for each of the sound ray paths along which the sound emitted from the sound generating point travels to reach the sound receiving point, in accordance with the directional characteristic of the generated sound stored in the storage section and the orientation of the sound generating point changed by the orientation control section ~~determined by the orientation determining section~~; and

a calculation section that performs a convolution operation between the impulse response determined by the impulse response determining section and the audio signal representing the sound generated from the sound generating point so as to apply thereto the acoustic effect.

Claim 2 (currently amended): The reverberation apparatus according to claim 1, wherein the ~~orientation determining section~~ orientation control section identifies a direction to a given target point from the sound generating point at the ~~position determined by~~ position indicated by the ~~position determining section~~ position indicating section, and ~~determines~~ changes the orientation of the sound generating point ~~in terms of~~ to the identified direction from the sound generating point to the target point.

Claim 3 (currently amended): The reverberation apparatus according to claim 2, wherein the ~~orientation determining section~~ orientation control section sets the target point to the sound receiving point in accordance with ~~the instruction by the user~~ an instruction by a user.

Claim 4 (currently amended): The reverberation apparatus according to claim 1, wherein the ~~orientation determining section~~ orientation control section identifies a first direction to a given target point from the sound generating point at the ~~position determined by~~ position indicated by the ~~position determining section~~ position indicating section, and ~~determines~~ changes the orientation of the sound generating point ~~in terms of~~ to a second direction making a predetermined angle with respect to the identified first direction.

Claim 5 (currently amended): The reverberation apparatus according to claim 4, wherein the ~~orientation determining section~~orientation control section sets the target point to the sound receiving point in accordance with the ~~instruction by the user~~an instruction by a user.

Claim 6 (currently amended): The reverberation apparatus according to claim 1, wherein the ~~position determining section determines~~position indicating section indicates the position of the sound generating point which moves in accordance with the ~~instruction from the user~~an instruction from a user, and wherein the ~~orientation determining section~~orientation control section identifies based on the ~~determined~~indicated position of the sound generating point a progressing direction along which the sound generating point moves, and ~~determines~~changes the orientation of the sound generating point ~~in terms of~~to the identified progressing direction.

Claim 7 (currently amended): The reverberation apparatus according to claim 1, wherein the ~~position determining section~~position indicating section ~~determines~~indicates the position of the sound generating point which moves in accordance with the ~~instruction from the user~~an instruction from a user, and wherein the ~~orientation determining section~~orientation control section identifies based on the ~~determined position~~indicated position of the sound generating point a progressing direction along which the sound generating point moves, and ~~determines the orientation~~changes the orientation of the sound generating point ~~in terms of~~to an angular direction making a predetermined angle with respect to the identified progressing direction.

Claim 8 (currently amended): A reverberation apparatus for creating an acoustic effect of an acoustic space which is arranged ~~under an instruction of a user~~ with a sound generating point for generating a sound and a sound receiving point for receiving the sound which travels from the sound generating point to the sound receiving point through sound ray paths within the acoustic space, and for applying the created acoustic effect to an audio signal representative of the sound generated from the sound generating point, the reverberation apparatus comprising:

a storage section that stores a directional characteristic of a sensitivity of the sound receiving point for the received sound;

~~a position determining section~~ position indicating section that ~~determines a position~~ indicates a position of the sound receiving point and a position of the sound generating point within the acoustic space on the basis of ~~the instruction from the user~~ an instruction from a user;

~~an orientation determining section~~ orientation control section that ~~determines an orientation~~ changes an orientation of the sound receiving point when the position indicating section indicates change of either of the position of the sound receiving point and the position of the sound generating point based on the position determined by the position determining section;

an impulse response determining section that determines an impulse response for each of the sound ray paths along which the sound emitted from the sound generating point travels to reach the sound receiving point, in accordance with the directional characteristic of the sensitivity for the received sound stored in the storage section and the orientation of the sound receiving point ~~determined by the orientation determining~~ changed by the orientation control section; and

a calculation section that performs a convolution operation between the impulse response determined by the impulse response determining section and the audio signal representing the sound generated from the sound generating point so as to apply thereto the acoustic effect.

Claim 9 (currently amended): The reverberation apparatus according to claim 8, wherein the ~~orientation determining section~~ orientation control section identifies a direction to a given target point from the sound receiving point at the ~~position determined by~~ position indicated by the ~~position determining section~~ position indicating section, and ~~determines the orientation~~ changes the orientation of the sound receiving point ~~in terms of~~ to the identified direction from the sound receiving point to the target point.

Claim 10 (currently amended): The reverberation apparatus according to claim 9, wherein the ~~orientation determining section~~ orientation control section sets the target point to the sound generating point in accordance with ~~the instruction by the user~~ an instruction by a user.

Claim 11 (currently amended): The reverberation apparatus according to claim 8, wherein the ~~orientation determining section~~ orientation control section identifies a first direction to a given target point from the sound receiving point at the ~~position determined by~~ position indicated by the ~~position determining section~~ position indicating section, and ~~determines the orientation~~ changes the orientation of the sound receiving point ~~in terms of~~ a second direction making a predetermined angle with respect to the identified first direction.

Claim 12 (currently amended): The reverberation apparatus according to claim 11, wherein the ~~orientation-determining section~~orientation control section sets the target point to the sound generating point in accordance with ~~the instruction by the user~~an instruction by a user.

Claim 13 (currently amended): The reverberation apparatus according to claim 8, wherein the ~~position-determining section~~position indicating section indicates the position of the sound receiving point which moves in accordance with ~~the instruction from the user~~an instruction from a user, and wherein the ~~orientation-determining section~~orientation control section identifies based on the ~~determined position~~indicated position of the sound receiving point a progressing direction along which the sound receiving point moves, and ~~determines the orientation~~changes the orientation of the sound receiving point ~~in terms of~~to the identified progressing direction.

Claim 14 (currently amended): The reverberation apparatus according to claim 8, wherein the ~~position-determining section~~position indicating section indicates the position of the sound receiving point which moves in accordance with ~~the instruction from the user~~an instruction from a user, and wherein the ~~orientation-determining section~~orientation control section identifies based on the ~~determined position~~indicated position of the sound receiving point a progressing direction along which the sound receiving point moves, and ~~determines the orientation~~changes the orientation of the sound receiving point ~~in terms of~~to an angular direction making a predetermined angle with respect to the identified progressing direction.

Claim 15 (currently amended): A machine readable medium encoded with a reverberation program executable by a computer for creating an acoustic effect of an acoustic space which is arranged ~~under an instruction of a user~~ with a sound generating point for generating a sound and a sound receiving point for receiving the sound which travels from the sound generating point to the sound receiving point through sound ray paths within the acoustic space, and for applying the created acoustic effect to an audio signal representative of the sound generated from the sound generating point, the reverberation program comprising the steps of:

providing a directional characteristic representing a directivity of the generated sound at the sound generating point;

~~determining a position~~indicating a position of the sound generating point ~~and a position of the sound receiving point within the acoustic space on the basis of the instruction from the user;~~

~~determining an orientation~~changing an orientation of the sound generating point when change of either of the position of the sound generating point and the position of the sound receiving point is indicated~~based on the determined position thereof;~~

determining an impulse response for each of the sound ray paths along which the sound emitted from the sound generating point travels to reach the sound receiving point, in accordance with the provided directional characteristic of the generated sound and the ~~determined~~changed orientation of the sound generating point; and

performing a convolution operation between the determined impulse response and the audio signal representing the sound generated from the sound generating point so as to apply thereto the acoustic effect.

Claim 16 (currently amended): A machine readable medium encoded with a reverberation program executable by a computer for creating an acoustic effect of an acoustic space which is arranged ~~under an instruction of a user~~ with a sound generating point for generating a sound and a sound receiving point for receiving the sound which travels from the sound generating point to the sound receiving point through sound ray paths within the acoustic space, and for applying the created acoustic effect to an audio signal representative of the sound generated from the sound generating point, the reverberation program comprising the steps of:

providing a directional characteristic of a sensitivity of the sound receiving point for the received sound;

~~determining a position~~indicating a position of the sound receiving point and a position of the sound generating point within the acoustic space ~~on the basis of the instruction from the user~~;

~~determining an orientation~~changing an orientation of the sound receiving point when change of either of the position of the sound receiving point and the position of the sound generating point is indicated ~~based on the determined position thereof~~;

determining an impulse response for each of the sound ray paths along which the sound emitted from the sound generating point travels to reach the sound receiving point, in accordance with the provided directional characteristic of the sensitivity for the received sound and the ~~determined~~changed orientation of the sound receiving point; and

performing a convolution operation between the determined impulse response and the audio signal representing the sound generated from the sound generating point so as to apply thereto the acoustic effect.

Claim 17 (currently amended): A reverberation method of creating an acoustic effect for an acoustic space which is arranged ~~under an instruction of a user~~ with a sound generating point for generating a sound and a sound receiving point for receiving the sound which travels from the sound generating point to the sound receiving point through sound ray paths within the acoustic space, and applying the created acoustic effect to an audio signal representative of the sound generated from the sound generating point, the reverberation method comprising the steps of:

providing a directional characteristic representing a directivity of the generated sound at the sound generating point;

~~determining a position~~indicating a position of the sound generating point and a position of the sound generating point within the acoustic space ~~on the basis of the instruction from the user~~;

~~determining an orientation~~changing an orientation of the sound generating point when change of either of the position of the sound receiving point and the position of the sound generating point is indicated~~based on the determined position thereof~~;

determining an impulse response for each of the sound ray paths along which the sound emitted from the sound generating point travels to reach the sound receiving point, in accordance with the provided directional characteristic of the generated sound and the changed~~determined~~ orientation of the sound generating point; and

performing a convolution operation between the determined impulse response and the audio signal representing the sound generated from the sound generating point so as to apply thereto the acoustic effect.

Claim 18 (currently amended): A reverberation method of creating an acoustic effect for an acoustic space which is arranged ~~under an instruction of a user~~ with a sound generating point for generating a sound and a sound receiving point for receiving the sound which travels from the sound generating point to the sound receiving point through sound ray paths within the acoustic space, and applying the created acoustic effect to an audio signal representative of the sound generated from the sound generating point, the reverberation method comprising the steps of:

providing a directional characteristic of a sensitivity of the sound receiving point for the received sound;

~~determining a position indicating a position~~ of the sound receiving point and a position of the sound generating point within the acoustic space ~~on the basis of the instruction from the user~~;

~~determining an orientation~~ changing an orientation of the sound receiving point when change of either of the position of the sound receiving point and the position of the sound generating point is indicated ~~based on the determined position thereof~~;

determining an impulse response for each of the sound ray paths along which the sound emitted from the sound generating point travels to reach the sound receiving point, in accordance with the provided directional characteristic of the sensitivity for the received sound and the changed ~~determined~~ orientation of the sound receiving point; and

performing a convolution operation between the determined impulse response and the audio signal representing the sound generated from the sound generating point so as to apply thereto the acoustic effect.